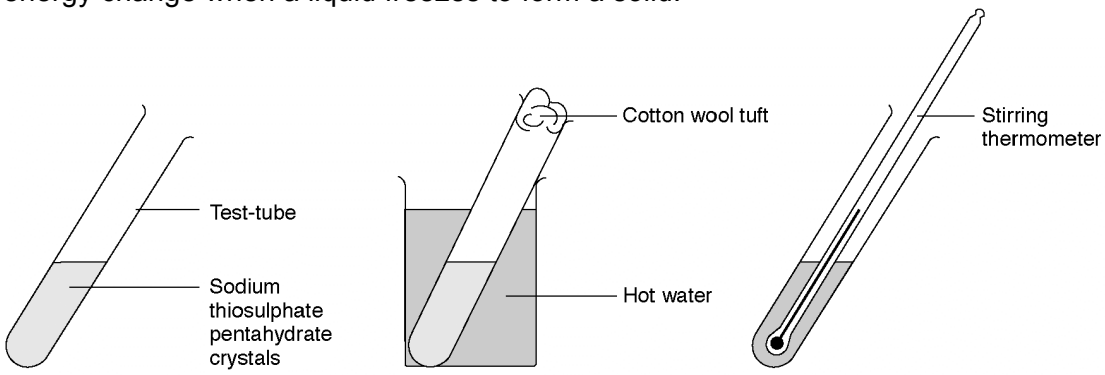
IGCSE chemistry section 1a — energetics of freezing

Introduction

When a substance changes state, energy can be produced or absorbed. This experiment illustrates the energy change when a liquid freezes to form a solid.



What to record

Record the temperature of the liquid and record the temperature as the liquid solidifies (this is the melting point of sodium thiosulfate pentahydrate).

What to do

1. Half fill a very clean test-tube with crystals of sodium thiosulfate-5-water.

2. Put a tuft of cotton wool in the top of the test-tube to exclude dust.

3. Warm the test-tube **gently** in a beaker of hot water (about 50 ^{o}C) to melt the crystals.

4. When all the crystals have melted, remove the cotton wool, put a thermometer in the melt and record the temperature. If the liquid does start to crystallise on inserting the thermometer, re-heat it in water to melt all the solid.

5. Stand the test-tube in an empty beaker and leave it in a still place to cool.

6. Observe the temperature at various intervals until the value is in the region of 30 – 40 °C. No crystallization should have occurred.

7. Add a fresh crystal of sodium thiosulfate, observe the rapid crystallisation which occurs, and once again continue to monitor the temperature at regular intervals.

8. Wait until the temperature has fallen to about 25 – 30 °C.

Safety Wear eye protection.

Questions

1. When a liquid turns into a solid is the process exothermic or endothermic?
2. When all the liquid has turned into solid the temperature begins to drop. Why is this?